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The Effects of Insurance Generosity on the Psychological Distress and Well-Being of a General Population

Results from a Randomized Trial of Insurance

Kenneth B. Wells, Willard G. Manning, Jr.,
R. Burciaga Valdez

REPORTS
HG
9396
W45
1989

RAND

The research described in this report was supported by the National Institute of Mental Health and by the Health Care Financing Administration, U.S. Department of Health and Human Services, Grant No. 99-C-98489/9-03.

ISBN: 0-8330-0979-6

The RAND Publication Series: The Report is the principal publication documenting and transmitting RAND's major research findings and final research results. The RAND Note reports other outputs of sponsored research for general distribution. Publications of The RAND Corporation do not necessarily reflect the opinions or policies of the sponsors of RAND research.

Published by The RAND Corporation
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90406-2138

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R-3682-NIMH/HCFA

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PREFACE

This report compares people's mental health status outcomes under alternative fee-for-service insurance plans. The work uses data from the RAND Health Insurance Experiment. This report is an expanded version of work presented in Wells et al. (1989). Among other RAND reports and papers that deal with fee-for-service insurance, the demand for mental health care, and mental health status are:

> R. B. Brook et al., "Does Free Care Improve Adults' Health? Results from a Randomized Controlled Trial," *The New England Journal of Medicine*, Vol. 309, No. 23, December 8, 1983, pp. 1426–1434.
>
> R. B. Brook et al., *The Effect of Coinsurance on the Health of Adults: Results from the RAND Health Insurance Experiment,* The RAND Corporation, R-3055-HHS, December 1984.
>
> E. B. Keeler et al., *The Demand for Episodes of Mental Health Services,* The RAND Corporation, R-3432-NIMH, October 1986.
>
> W. G. Manning et al., "How Cost Sharing Affects the Use of Ambulatory Mental Health Services," *Journal of the American Medical Association*, Vol. 456, No. 14, October 10, 1986, pp. 1930–1939.
>
> R. B. Valdez et al., "Consequences of Cost-Sharing for Children's Health," *Pediatrics*, Vol. 75, No. 5, 1985, pp. 952–961.
>
> R.O.B. Valdez, *The Effects of Cost Sharing on the Health of Children,* The RAND Corporation, R-3270-HHS, March 1986.
>
> K. B. Wells et al., *Cost Sharing and the Demand for Ambulatory Mental Health Services,* The RAND Corporation, R-2960-HHS, September 1982.

The research reported herein was supported by funding from the National Institute of Mental Health and the Health Care Financing

Administration, U.S. Department of Health and Human Services. The opinions and conclusions expressed are those of the authors and should not be construed as representing the opinions or policy of any agency of the U.S. government or The RAND Corporation.

SUMMARY

A higher level of cost sharing in fee-for-service insurance lowers the use of general medical and mental health services; but does greater cost sharing lead to lower mental health for the covered population? We addressed this question using data from the RAND Health Insurance Experiment. Families in six U.S. sites were randomly assigned to one of 14 fee-for-service insurance plans for periods of three or five years.

On average, there were no significant adverse effects of cost sharing plans, relative to a free care plan, on overall mental health status or either of its two principal components—psychological well-being and psychological distress—when the cost sharing plans included full catastrophic coverage. Those with high mental health status but low income at the beginning of the experiment had significantly more favorable mental health outcomes on the cost sharing plans than on the free care plan. We cannot definitively comment on the effects of insurance generosity for those who were initially both sick and poor.

Our findings apply in the context of mandated comprehensive mental and general health coverage for a general nonelderly, nondisabled household population.

ACKNOWLEDGMENTS

We would like to thank: Audrey Burnam and Joseph Newhouse at RAND for their suggestions; Bernadette Benjamin for her meticulous programming and data management; and Paul Widem (National Institute of Mental Health), Carl Taube (Johns Hopkins, formerly NIMH), and Thomas Kickham (Health Care Financing Administration) for their support. Neither The RAND Corporation, nor any of the above-named people necessarily agree with or endorse the findings reported here.

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I. INTRODUCTION

Over the last two decades, public concern about the escalating costs of health care has led to the widespread implementation of cost-containment mechanisms, such as increased cost sharing by the consumer in fee-for-service insurance plans. Through features such as deductibles and coinsurance rates, employers and third-party carriers provide financial incentives to consumers to curtail their use of services. But patient and provider groups have expressed concerns that cost sharing could adversely affect both general and mental health status through reducing use. Others have argued that very generous coverage (e.g., low cost sharing) could adversely affect health through encouragement of the sick role or other iatrogenic effects related to increased use (Rice and Wilson, 1976; Miller and Stokes, 1978; Newhouse and Friedlander, 1980; Hadley, 1982).

Until recently, there were no data to inform this debate. With one exception, previous studies of cost sharing (reviewed by Newhouse, 1978; Frank and McGuire, 1986; Keeler et al., 1986) focused on its effects on use of medical or psychiatric services. This is because the data did not include information on changes in health status.

The RAND Health Insurance Experiment (HIE) was designed specifically to provide estimates of the effects of variations in cost sharing on the health status of a covered general population, and thus is the first study of this issue. It was also designed to provide estimates of the effects of such variations on the use of services, unconfounded by the effects of self-selection of coverage. Other studies have been observational, in which individuals could select their own employer or insurance plan. Thus, it has been difficult to know how much of the increased use on more generous plans observed in these studies was due to generosity of coverage per se and how much to adverse selection of sicker individuals to more generous plans.

The HIE, as a study of cost sharing, is unique in three respects. First, the participants represent a general population, rather than specific insured populations such as employees. Second, it randomly assigned insurance coverage to participants. Third, the HIE plans were designed to vary in generosity in only a few key dimensions, facilitating the interpretation of coverage effects. In other studies, insurance plans were hard to compare because they differed in several dimensions. Thus, the HIE is to studies of cost sharing as the first randomized trials of standardized forms of psychotherapy are to studies of the costs and effectiveness of alternative forms of psychotherapy.

Major published results concerning the effects of HIE plans on the use of medical services are:

1. Medical expenditures are about 50 percent higher on a free care plan than on plans with coinsurance, subject to full catastrophic coverage (Newhouse et al., 1981; Manning et al., 1987).
2. Increased cost sharing reduces both the probability of inpatient (medical and psychiatric combined) care and the number of episodes of outpatient medical care (Keeler and Rolph, 1983).
3. A small outpatient deductible, followed by free care, significantly reduces total medical care expenditures, relative to free care (i.e., no out-of-pocket cost) (Newhouse et al., 1981; Manning et al., 1987).

Important findings concerning use of outpatient psychotherapy (Keeler et al., 1986; Manning et al., 1986) include:

1. Greater cost sharing significantly reduces use of mental health services, primarily by reducing the probability of having any use in a year.
2. Increases in cost sharing lower the use of outpatient psychotherapy more than the use of outpatient medical services, but the difference in response is not as great as would be expected from nonexperimental studies.
3. A small outpatient deductible followed by free care has no significant effect on the use of outpatient psychotherapy, relative to free care.

With insurance generosity having large effects on use, one might also expect large differences in health outcomes. Using HIE data, Brook et al. (1983, 1984) found significant favorable effects of free care, relative to cost sharing plans, on far-vision and blood pressure control for the average adult. However, there were no significant effects of free care on general health perceptions; physical, social, and role functioning; acute physical symptoms; and general mental health status, as assessed by self-administered questionnaires. Valdez et al. (1985) and Valdez (1986) reached similar conclusions about the effects of cost sharing on general and mental health status and functioning for children. For participants with low incomes and poor mental health status at baseline (i.e., the sick poor), the confidence intervals for the effects of plan on mental health status were large: For the adult sick-poor group, the result "favored" free care; for the child sick-poor group, the result “favored” the cost sharing plans. But these findings were not statistically significant.

In this report, we reexamine the effects of HIE insurance plans on mental health status, for several reasons. First, the findings of Brook, Valdez, and their colleagues are provocative and at variance with the prior beliefs of much of the public health community. Second, the previous analyses used data on health status collected at baseline and at exit from the experiment (three or five years later). In the HIE, however, health status was assessed yearly throughout the study. Because many psychiatric disorders such as major depression are episodic, we thought that including the data from the middle years of the experiment might reveal effects of plan on mental health status that could not be detected with the exit data alone. Third, as noted above, there was a suggestion of an effect for the sick poor that the previous analyses did not have the precision to detect. We decided to combine data on adults and children and on all years of participation to examine with greater precision the effects of cost sharing on this important subgroup.

Fourth, Brook et al. (1983, 1984), Valdez et al. (1985) and Valdez (1986) examined the effects of insurance generosity on the Mental Health Index (Veit and Ware, 1983), a summary indicator that aggregates information on two distinct subdimensions—psychological distress (i.e., symptoms of anxiety and depression) and psychological well-being (i.e., level of positive affect and quality of interpersonal ties). In this report, we examine also the effects of insurance generosity separately for the two subdimensions. From earlier work, we know that psychological distress is much more predictive of use of mental health services than is psychological well-being (Ware et al., 1984). This suggests that increases in cost sharing, by lowering use of mental health services, would be more likely to adversely affect psychological distress (for which people seem to be seeking care) than psychological well-being (which has little independent relationship with use).

We also thought that results based specifically on the psychological distress measure would be more clinically meaningful than those based on psychological well-being. Consisting of items that assess the frequency and intensity of symptoms of anxiety and depression, the psychological distress measure is similar in content to the NIMH Center for Epidemiology Depression Scale (CES-D) (Radloff, 1977) and the General Health Questionnaire (Goldberg, 1972). It is increasingly being used as an outcome measure in medical and psychiatric research (Lehman, 1983; Smith et al., 1986; Cassileth et al., 1984). By contrast, the clinical meaningfulness of psychological well-being as a component of mental health status remains uncertain.

Like Brook et al. (1983, 1984), Valdez et al. (1985), and Valdez (1986), we examine the direct effects of variation in cost sharing on mental health status of the total covered population, rather than first estimating its effects on use of services, and then estimating the effects of variations in use on mental health status. Our approach reflects two considerations. First, the total impact of variation in insurance generosity is the sum of its effects on mental health status for those who receive care and for those who do not. The untreated, as well as the treated, may experience changes in mental health status over time. These changes reflect effects of variation in cost sharing because such variation affects the proportion and case mix of the covered population that remains untreated. Second, in the HIE, participants were randomly assigned to insurance coverage, not treatment. Thus, for purposes of estimating effects of variation in use of services on outcome, the HIE has a weak observational design, whereas for purposes of estimating the direct effects of insurance, it has a strong experimental design.

The remainder of this report contains three sections. First, we describe the design of the RAND Health Insurance Experiment, its measures of mental health status, and our statistical methods. Second, we present results of insurance coverage on overall mental health status, psychological well-being, and psychological distress, based on both analysis of variance and multiple regression methods. Finally, we discuss the results and the limitations of the analysis.

II. DATA AND STATISTICAL METHODS

DESIGN OF THE HEALTH INSURANCE EXPERIMENT

In this report, we use data from the fee-for-service part of the Health Insurance Experiment (HIE).[1] A subsequent report will contrast the performance of fee-for-service plans and a prepaid group practice.

Between November 1974 and February 1977, the HIE enrolled families in six sites: Dayton, Ohio; Seattle, Washington; Fitchburg, Massachusetts; Franklin County, Massachusetts; Charleston, South Carolina; and Georgetown County, South Carolina. In each site, families enrolled for either three or five years.

Insurance Plans

Families participating in the experiment were randomly assigned to one of 14 different fee-for-service (FFS) insurance plans. The fee-for-service insurance plans varied cost sharing over two dimensions. The coinsurance rates (percentage paid out of pocket by the patient) were 0, 25, 50, or 95 percent for all health services. Each coinsurance plan had an upper limit (the maximum dollar expenditure or MDE) on annual out-of-pocket expenses of 5, 10, or 15 percent of family income, up to a maximum of $1,000. Beyond the MDE, the insurance plan reimbursed all health expenses in full for the remainder of the accounting year. One plan had different coinsurance rates for medical services (25 percent) than for dental and outpatient mental health services (50 percent).[2] Finally on one plan, the families faced a 95 percent coinsurance rate for outpatient services, subject to a $150 annual limit on out-of-pocket expenses per person (or $450 per family). In this plan, all inpatient services were free; in effect, this plan had an outpatient individual deductible.[3] Table 1 summarizes the fee-for-service plan characteristics.

In this report, we group plans as “free” (no cost sharing), family coinsurance or family pay,[4] and individual (outpatient) “deductible” plans.

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[1] Newhouse (1974), Newhouse et al. (1981), Brook et al. (1983, 1984), and Valdez (1986) provide fuller descriptions of the design.

[2] Inpatient psychiatric services have the same coinsurance rate as inpatient medical services on all plans.

[3] If the coinsurance rate for the plan with individual limits were exactly 100 percent, rather than 95 percent, then it would be exactly a deductible plan.

[4] Plans with coinsurance rates of 25, 50 or, 95 percent with no deductible.

Table 1

FEE-FOR-SERVICE INSURANCE PLAN CHARACTERISTICS

Plan	Medical Coinsurance Rate (%)	Mental Health Coinsurance Rate (%)	Annual Upper Limit on Out-of-Pocket Expenses
Free	0	0	0
Family coinsurance			
25/25	25	25	5, 10, or 15% of income, up to $1,000
25/50	25	50	5, 10, or 15% of income, up to $1,000
50/50	50	50	5, 10, or 15% of income, up to $1,000
95/95	95	95	5, 10, or 15% of income, up to $1,000
Individual deductible	95% ambulatory 0 inpatient	95% ambulatory 0 inpatient	$150/person or $450/family

A simple example illustrates how an HIE family coinsurance plan works. Consider a family facing a 25 percent coinsurance rate for all health services and an upper limit on out-of-pocket expenses of $1,000. For the first $4,000 of expenditures for any health service (dental, medical, or mental health), the family pays 25 percent of the bill and the insurance company pays 75 percent. Beyond that point, the family pays nothing more out-of-pocket that year, because it has already paid the $1,000 upper limit on out-of-pocket expenditures (= 0.25 × $4,000). At the beginning of the new accounting year, the family again pays 25 percent of the bill, until it reaches its annual upper limit on out-of-pocket expenses.

As this example illustrates, the family's response to an experimental insurance plan is an amalgam of responses to the coinsurance rate below the upper limit on out-of-pocket expenses, and free care beyond the limit. In this report, we focus largely on the overall effect of the insurance plan. In the results section, we also examine the separate effect of the coinsurance rate, using a method developed by Ellis (1986).

All plans covered the same services.[5] These included psychiatric inpatient care and up to 52 outpatient psychotherapy visits per year per person delivered by any physician, psychologist, psychiatric social worker, nurse, or other licensed therapist.

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[5] See Clasquin (1973) for a discussion of the reasons for the HIE structure of benefits. Nonpreventive orthodontia and cosmetic surgery (not related to preexisting conditions) were not covered. In the case of each exclusion, it is questionable whether anything

Sample Selection and Assignment

Families were assigned to experimental plans using the Finite Selection Model (Morris, 1979). This model is designed to achieve as much balance across plans as possible while retaining randomization; that is, it reduces correlation of the experimental plans with health, demographic, and economic covariates.

Families were enrolled as a unit, but only those family members who were eligible (see criteria below) participated. No choice of plan was offered; the family could either accept the offered experimental plan or choose not to participate. To prevent refusals, families were given a lump-sum payment greater than the worst-case outcome in their HIE plans relative to their previous plan; thus, families were always better off financially for accepting the HIE enrollment offer. Moreover, because of a bonus for completion, they were always better off completing the study. Hence, there is a theoretical presumption of no bias from refusal or attrition. In fact, we have detected negligible effects from refusal and attrition (Brook et al., 1983, 1984; O'Grady et al., 1984; Newhouse et al., 1987).

The family's pre-experiment coverage was maintained for the family by the HIE during the experiment, with the benefits of the policy assigned to the HIE. If the family was uninsured before the study, the HIE purchased a policy on its behalf. Thus, no family could become uninsurable as a result of participation in the study.

The Sample

The sample is a random sample of each site's population, but the following groups were not eligible: (1) those 62 years of age and older at the time of enrollment; (2) those with incomes in excess of $25,000 in 1973 dollars (or $61,000 in 1985 dollars—this excluded 3 percent of the families contacted); (3) those eligible for the Medicare disability program; (4) those in jails or institutionalized for indefinite periods; (5) those in the military or their dependents; and (6) veterans with service-connected disabilities.

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could have been learned about steady-state demand during the three- to five-year lifetime of the experiment. Also excluded were outpatient psychotherapy services in excess of 52 visits per year per person.

The sample for this report consists of fee-for-service enrollees age five or older at enrollment who completed (or whose parents completed) the appropriate mental health questionnaires. The sample at enrollment consists of 4,829 adults and children aged five or older, with at least one of the three mental health measures at enrollment. The unit of analysis is each person during a particular year of participation. The complete analytic sample consists of 14,900 such person-years (see Table 2).

DEPENDENT VARIABLES—OUTCOMES

The Mental Health Inventory (MHI) was designed specifically to measure mental health status in the HIE (Veit and Ware, 1983). The adult version is based on 38 self-administered items that were positively scored on a 0–100 scale. The MHI was adapted from the General Well-Being Schedule (Dupuy, 1974) and other measures (Costello and Comrey, 1967; Dohrenwend et al., 1980; Beck, 1967). A similar measure has been developed for children aged five to 13, based on 12 questionnaire items (Eisen et al., 1980). The item content for the adult battery is summarized in Table 3.

Table 2

ENROLLMENT AND ESTIMATION SAMPLE

Plan	Enrollment[a] (Persons)	Estimation[b] (Person-Years)
Free	1,585	5,049
Family coinsurance[a]		
25 percent	504	1,656
50 percent	737	2,325
95 percent	900	2,683
Individual deductible	1,103	3,187
Total	4,829	14,900

[a] Family coinsurance plans are subject to an upper limit on out-of-pocket expenses of no more than $1,000 per year. The coinsurance rate is for outpatient mental health care.

[b] Excludes individuals not present at enrollment (i.e., newborns) or those who had missing data on all three mental health status variables at entry. As a result, children in Dayton were excluded because the mental health battery was not fielded at enrollment in that site. The coinsurance rate is the mental health coinsurance rate.

Table 3

PSYCHOLOGICAL DISTRESS AND WELL-BEING
ITEM CONTENT OF MHI ADULT VERSION

Subscale/Item Content
Anxiety
Very nervous person
Bothered by nervousness
Felt tense or high-strung
Anxious, worried
Difficulty trying to calm down
Nervous or jumpy
Restless, fidgety, impatient
Rattled, upset, flustered
Hands shake when doing things
Relax without difficulty
Depression
Moody, brooded about things
Low or very low spirits
Felt downhearted and blue
Felt depressed
Strain, stress, pressure
Loss of Behavioral/Emotional Control
Control behavior, thoughts, feelings
Concern about losing control of mind
Felt emotionally stable
Nothing turns out as wanted
Felt like crying
Better off if dead
Down in the dumps
Think about taking own life
Nothing to look forward to
General Positive Affect
Happy person
Happy, satisfied or pleased
Daily life interesting
Felt calm and peaceful
Felt cheerful, lighthearted
Generally enjoyed things
Relaxed and free of tension
Living a wonderful adventure
Expect an interesting day
Wake up fresh, rested
Future hopeful, promising
Emotional Ties
Felt loved and wanted
Love relations full, complete
Time felt lonely

NOTE: All items in this table are positively scored, i.e., in the direction of better health.

The MHI evaluates psychological constructs but does not assess physical and psychosomatic symptoms. It includes items measuring the frequency and intensity of symptoms of both psychological distress (e.g., anxiety and depression) and psychological well-being.

The MHI has a factor structure that is generalizable across the HIE sites (Veit and Ware, 1983). This structure is characterized by higher level bipolar factors for psychological distress (PSDS) and psychological well-being (PWB). Psychological distress and psychological well-being are each represented by a scale, which combine to form the total MHI score. For adults, five subscales represent the dimensions within psychological distress (anxiety, depression, loss of behavioral or emotional control) and psychological well-being (general positive affect and interpersonal ties). For children, these subscales capture information on distress (anxiety and depression) and well-being (positive affect). Each scale is scored on a scale of 0 to 100. For both MHI and PWB, a higher score indicates better mental health. For the psychological distress scale, a higher score indicates poorer mental health. The correlation between psychological distress and psychological well-being is −0.75.

Reliability and Validity

The MHI is reliable in a general population, exhibiting a Cronbach's alpha (Cronbach, 1951) of 0.96 for the HIE population. The internal consistency reliability estimates for all three scales range from 0.92 to 0.96. A substantial proportion of the variance in these scales is maintained from year to year. Stability coefficients range from 0.64 to 0.69 for the MHI, from 0.61 to 0.67 for PSDS, and from 0.62 to 0.68 for PWB. The PSDS and PWB contain a substantial amount of unique variance as demonstrated by correlations ranging from −0.67 to −0.73 which are considerably lower than the reliability estimates.

The MHI has excellent construct validity (Veit and Ware, 1983; Ware et al., 1980; Williams et al., 1981). MHI is sensitive to the impact of stressful events and to social support. The total MHI score strongly predicts the use of outpatient mental health services. For example, the subsample in the bottom third of MHI (total score) uses nearly three times as much outpatient mental health services as the upper third (Wells et al., 1982; Ware et al., 1984).

For each measure, we define initially "sick" and "well" as being the lowest and highest thirds of the scale distribution of that mental health status measure at the beginning of the study.

Estimating Effect Sizes

To facilitate the interpretation of an annual change in mental health scores, we took advantage of the longitudinal HIE database to examine the impact of four common negative life events in a given year on change in mental health status over the subsequent year, controlling for prior mental health status (see Table 4). Specifically, we used a nested variance component model, with change over the year in each mental health status measure as the dependent variable. This model accounts for the fact that persons are nested within families, and allows us to separate family-level and person-level effects. We included the following variables as covariates: age, sex, mental health status in the prior year, and an indicator for the occurrance of a prior life stress event. See Table 4 for the events considered.

Each of the four life stress events occurred to about 10 percent of our sample, except physical attack. Only 3 percent of the sample responded that they were assaulted. Although this item is rare, it is the most severe event and should have a dramatic impact on mental health status.

The life stress events negatively affected mental health status (Table 5). The magnitude of the effect increased monotonically with the severity of the event; for example, being robbed reduced the MHI by 0.6 units but being physically attacked reduced the MHI by 5.4 units. This effect was also observed for PWB and PSDS.

The average effect of being fired or laid off net of prior mental health status and prior loss of a job results in a −2.3 MHI, −2.9 PWB, and 1.7 PSDS unit shift in mental health status. Thus, on average someone fired or laid off in the last 12 months scores about 2.3 points lower on the MHI. Similarly someone who was physically attacked or robbed or experienced an accident scored 5.4, 0.6, and 1.4 units lower on the MHI, respectively, than those who did not experience such stressful events.

Table 4

LIFE STRESS EVENTS ITEMS FOR ADULTS

Did anyone rob you or steal something from you?
Were you in any kind of accident that involved property damage?
Have you been fired or laid off from any job?
Were you physically attacked or assaulted in any way?

Table 5

AVERAGE EFFECT ON MENTAL HEALTH STATUS MEASURES OF STRESSFUL LIFE EVENTS

Life Stress Event	MHI	PWB (Standard Error)	PSDS
Robbed	−0.62 (0.353)	−0.35 (0.472)	0.87 (0.334)
Accident	−1.35 (0.366)	−1.67 (0.489)	1.12 (0.345)
Fired/laid off	−2.34 (0.442)	−2.85 (0.606)	1.66 (0.408)
Attacked	−5.40 (0.734)	−0.570 (0.968)	4.59 (0.665)

EXPLANATORY VARIABLES

Our primary explanatory variables include:

- Plan indicators for the free, family coinsurance (or family pay), and individual deductible plans.
- Enrollment mental health status, psychological distress, or psychological well-being.
- Family income adjusted for family size.

To look for differential plan response by subgroups of interest (e.g., the poor or the initially sick), the equations include two- and three-way interactions between plan, initial mental health status, and family income adjusted for family size. To enhance the precision of our estimates and to control for different rates of regression to the mean, we also included covariates for site, age, sex, race, education, general health perceptions, and physical limitations. In preliminary analysis, we included two- and three-way interactions between plan, initial mental health status, and age (child versus adult). These were not significant and thus were dropped in final models. The only significant interaction with age was year of participation in study. This interaction indicates that children and adults had different rates of regression to the mean over time.

Our measure of general health perceptions, the general health ratings index (GHI), is based on 22 questionnaire items for adults and seven items for children (younger than 14) measuring perceptions of health at the present, in the past, and in the future, resistance to illness and health worry (Ware, 1976; Eisen et al., 1980; Stewart et al., 1981). It differs from the MHI in that the items refer to health in general, rather than focusing on specific components of health. Our physical limitations measure is a dichotomous variable indicating any limitation in physical (self care, mobility, and physical activity) or role (normal daily activities) functioning due to physical health, based on 26 items (Stewart et al., 1978, 1981).

Except for family income, the data were collected before or at enrollment and at the end of each experimental year. Our measure of income, collected during the first year of the study, is the ratio of family income to the square root of family size. It is designed to capture disposable income per person.

STATISTICAL METHODS

In this analysis, we have used both analysis of variance (ANOVA) and least squares regression methods to estimate the effects of insurance coverage on changes in mental health status. Specifically, we regress the difference between that year's value and the entry value of mental health status on insurance coverage. That is, our comparisons are of the before-and-after variety. All differences are stated in terms of annual changes, whether they occurred in the first or last year of the period examined. We adjusted for the amount of time elapsed between that year's and the entry measurements. This adjustment corrects for the fact that people who participated for more years would have a greater chance of having a change in mental health status. Each difference is deflated by the amount of time from the beginning of the study to the time of assessment, i.e., we divided each mental health change by the number of years since enrollment.

Heteroscedasticity

As a result of stating all differences in annual terms, the data exhibit a heteroscedastic response. Observations averaged over a five-year period are less variable than those averaged over a one-year period. Because we could not reject the hypothesis that the variance was inversely proportional to time at risk, all observations have been weighted to reflect time at risk.

Correlated Responses

Our data exhibit positive correlations between individuals in the same family, and the same individual over time. Using differences (response at time t minus response at time 0) removes some but not all of the correlations by differencing out any stable individual component of variation. However, differencing also induces some correlation. Each year's response includes a permanent and transitory individual unobserved component. Differencing removes the permanent component but adds the (negative of the) entry transitory term to each subsequent error for differences. As a result, we observe a positive correlation among differences.

We model this correlation using a nested variance component or intraclass cluster model (Maddala, 1971; Searle, 1971). Specifically the model is

$$\Delta\text{MH Status}_{\text{ift}} = x'_{\text{ift}}\beta + \mu_f + \nu_i + \epsilon_{\text{ift}} \qquad (1)$$

where ΔMH Status and x are the dependent and a column vector of independent variables (transformed to remove the annualizing heteroscedasticity) for person i in family f at time t, β is a coefficient vector to be estimated, μ is an unobserved family effect (distributed across families with mean 0 and variance σ_μ^2), ν is an unobserved individual effect (independently and identically distributed across persons with mean zero and variance σ_ϵ^2), and ϵ is an error term (distributed across observations with mean 0 and variance σ_ϵ^2).

We use a two-step random effects estimator. We estimate the ordinary least squares (OLS) version of Eq. (1). The variances of μ, ν, and ϵ are estimated from the OLS residuals, correcting for the unequal number of observations per person and per family (Searle, 1971). With these estimated values, we then obtain the generalized least squares (GLS) estimate of β.

$$\beta_{GLS} + (X'\Omega^{-1}X)^{-1+X'}\,\Omega^{-1}$$

where Ω is block diagonal with a block D_F for each family f; D_I is block diagonal with blocks P_i for each person:

$$\Omega = \begin{pmatrix} D_1 & & & \\ & D_2 & 0 & \\ & & \ddots & \\ & 0 & & D_M \end{pmatrix}$$

$$D_F = \begin{pmatrix} \mathrm{P}_1 & & & & \\ & \mathrm{P}_2 & & \rho_\mathrm{F} & \\ & & \cdot & & \\ & \rho_\mathrm{F} & & \cdot & \\ & & & & \cdot \\ & & & & & \mathrm{P}_\mathrm{T} \end{pmatrix}$$

$$P_I = \begin{pmatrix} 1 & & & & \\ & 1 & & & \\ & & 1 & \rho_\mathrm{I} & \\ & & & \cdot & \\ & \rho_\mathrm{I} & & \cdot & \\ & & & & \cdot \\ & & & & & 1 \end{pmatrix}$$

with intrafamily correlation:

$$\rho_F = \sigma_\mu^2 / (\sigma_\mu^2 + \sigma_\nu^2 + \sigma_\epsilon^2)$$

and intraperson correlation:

$$\rho_I = \sigma_\nu^2 / (sigma^{\mu^2} + \sigma_\nu^2 + \sigma^{\epsilon^2})$$

and D_F has the same dimension as the number of person years in family F, and P_I has the same dimension as the number of years for person I.

We use a random effects estimator for two reasons. First, by the design of the study, plan is orthogonal to μ_F and ν_I. Second, we could not estimate a fixed effects model because all members of the same family have the same insurance. That is, a fixed effects model would not be full rank.

The error term exhibits mild autoregression. Given the limited number of observations on each individual and the weak autoregression, our approach is an adequate approximation. It avoids the large cost of mixed variance components ARIMA models.

Differences from Earlier HIE Analyses

Our statistical model differs from that of Brook et al. (1983) and Valdez et al. (1985) in a number of respects. First, we pool observations on children and adults. If the responses are not too dissimilar, then pooling these two groups increases our precision by increasing sample size.

Second, we use the intermediate years of data as well as the exit values. If the responses are not perfectly correlated from year to year, then including these data will increase the precision of our approach. But including these intermediate observations means that we must correct for intertemporal and intrafamily correlation.[6] The earlier analyses needed to correct for only intrafamily correlation.

Third, we control for time at risk by annualizing changes, rather than just including time-at-risk and the interaction of time-at-risk and entry health status as covariates. Our approach implies no plan-related change in mental health status if no time has elapsed, whereas the earlier approach allowed the magnitude of the plan response to be independent of the time-at-risk, no matter how short. Our approach fits the earlier years of the study, but the previous approaches did not (but then those studies did not include the early years, except for some adult attrition cases). Unfortunately, our annualizing approach is not without cost, because it induces the heteroscedastic error mentioned above—a problem that earlier RAND work did not face.

Fourth, we use a more efficient estimation technique than previously employed. The earlier studies reported OLS parameter estimates and a corrected set of inference statistics. Their correction for heteroscedasticity and intrafamily correlation was nonparametric, based on Huber's (1967) approach. In contrast, we used generalized least squares methods, which yield more efficient estimates if the parametric specification of the error above (Eq. 1) is correct (Maddala, 1971, 1977; Judge et al., 1980, 1982).

THREATS TO VALIDITY

There are two potential threats to the balance of health and other characteristics across the insurance plans: nonrandom refusal of the offer to participate, and nonrandom attrition from the study. Refusals of the plan offer varied from 6 percent on the free plan to 23 percent on the 95 percent coinsurance plans in the non-Dayton sites (see Brook et al., 1984).[7] Analysis of these refusals to participate indicate that the only significant differences between those who accepted and those who rejected the offer was that the latter had lower education and income. Income and education are both controlled for in our analysis. There is no evidence that those who rejected the offer to participate were sicker, nor that there was an interaction between plan, sickness, and refusal of the offer.

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[6] See the discussion above on our statistical methods.

[7] Data on refusals from Dayton are incomplete and hence were not analyzed, but the refusal of the enrollment offer across all plans in Dayton was only 7 percent. Additionally, we have compared the group that enrolled on all plans with the group that completed baseline interviews but did not enroll. The only significant difference was that children are overrepresented by a modest amount in the group that enrolled (Morris, 1985). No significant preexperimental differences were found for self-reported utilization and health status (Morris, 1985). Age is explicitly controlled for in our analysis.

If the refusal of plan were random with respect to mental health status, we would expect to find no significant differences in entry values for our three measures of mental health status—the Mental Health Inventory (MHI), psychological distress (PSDS), and psychological well-being (PWB), which are described below. As Table 6 indicates, there is no plan bias in the overall MHI measure, or the more clinically relevant psychological distress subcomponent. Psychological well-being exhibits a statistically significant difference ($p < 0.05$) between the free and individual deductible plans, with the average enrollee on the individual deductible plan being "sicker" on average at the beginning of the study.

The PWB result is the opposite sign from what we expected a priori from a plan refusal related to mental health status. Our expectation was that the initially ill offered a less generous plan would be more likely to refuse than if offered a very generous plan such as the free plan. This would tend to make enrollees in the high refusal plans,

Table 6

DIFFERENCES IN MENTAL HEALTH STATUS BY PLAN GROUP AT ENTRY—ALL ENROLLEES AND NORMAL COMPLETIONS

Plan Comparison	MHI		PSDS		PWB	
	Diff.	t	Diff.	t	Diff.	t
All enrollees						
Family coinsurance–free	−0.16	−0.27	0.02	0.03	−0.71	−0.93
Individual deductible–free	−0.86	−1.25	0.30	0.45	−1.99	−2.22[a]
Overall difference by plan						
F(2, 4396)	0.85		0.12		2.48[a]	
Normal completions[b]						
Family coinsurance–free	0.20	0.34	−0.29	−0.52	−0.22	−0.29
Individual deductible–free	−0.36	−0.50	−0.16	−0.23	−1.44	−1.57
Overall difference by plan						
F(2, 4396)	0.34		0.13		1.38	

[a] Significant at $p < 0.10$.

[b] Individuals who completed their full three- or five-year enrollment period.

such as the family coinsurance and individual deductible plans, healthier on average. We observed the opposite for psychological well-being.

Individuals on the family coinsurance and individual deductible plans were also more likely to leave the study early than were individuals on the free plan. Those who left the study early were sicker on average than those who stayed. The dropouts have MHI ($p < 0.10$) scores that are lower than stayers by an amount larger than the drop in mental health status associated with being fired or laid off. Despite the difference between dropouts and stayers overall, the only significant and systematic difference in mental health status among dropouts *by insurance plan* is for MHI, where the individual deductible dropouts are sicker on average than dropouts on other plans.

The net effect of refusal and attrition on mental health status was that the plans were not significantly imbalanced at enrollment for those who stayed until the end of the study. Although psychological well-being was not balanced at enrollment for the whole sample, it was balanced across plans at enrollment for the stayers.

Nevertheless, to reduce potential refusal and attrition bias, we included initial health status measures as covariates. We also tested directly whether the dropouts had a different response to insurance plan than the stayers. We conducted a version of the main analysis of effects of plan on mental health status in which we included two-way interactions between attrition status and plan indicators. There were too few cases to include the corresponding three- and four-way interactions among attrition, plan indicators, income, and initial mental health status. We generated attrition-corrected predictions of the main effects of plan on change in mental health status. In these predictions, each plan was treated as having that plan's mix of stayers and dropouts, i.e., its predicted response was the average of the response of stayers and dropouts weighted according to the percentage of participants who were stayers or dropouts on that plan.

III. RESULTS

MAIN EFFECTS OF PLAN

Table 7 compares the actual and adjusted mean annualized change in mental health status for the family coinsurance and individual deductible plan groups, each relative to the free plan. The adjusted means are predictions based on multiple regression estimates that control for differences in age, sex, prior mental health status, and other differences among the plans.[1] There are no statistically significant (at the $\alpha = 0.05$ level) or clinically meaningful differences in mean effects of the insurance plan groups. The same results are obtained whether or not we adjust for initial mental health status and other covariates or correct for attrition.

Table 7

DIFFERENCES AMONG INSURANCE PLANS IN CHANGE IN MENTAL HEALTH STATUS

Plan Comparison	MHI		PSDS		PWB	
	Diff.	t	Diff.	t	Diff.	t
Unadjusted (actual means)						
Family coinsurance–free	–0.10	–0.76	0.08	0.60	–0.08	–0.42
Individual deductible–free	0.13	0.80	–0.13	–0.83	0.21	0.94
Adjusted predictions[a]						
Not attrition-corrected						
Family coinsurance–free	0.14	0.87	–0.18	–1.15	0.13	0.59
Individual deductible–free	0.23	1.17	–0.26	–1.39	0.03	0.09
Attrition-corrected						
Family coinsurance–free	0.22	1.33	–0.27	–1.73	0.19	0.86
Individual deductible–free	0.39	1.79	–0.32	–1.59	–0.01	–0.03

NOTE: A positive difference indicates that the free plan is worse for MHI and PWB, and a negative difference for PSDS indicates that the free plan is worse. None of the comparisons are significant at $p < 0.05$, two tailed.

[a] Estimates are based on the full sample of 14,900 person years (observations). The predictions are standardized to the enrollment sample.

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[1] This is like the usual age/sex adjustment except that: (1) It is based on multiple regression methods; and (2) it controls for all nonplan explanatory variables.

We have the precision to detect major plan effects on average mental health status. For example, the 95 percent confidence interval for the effect of the difference between the family coinsurance plan and the free plan for MHI is (−0.11, +0.55) in units per year.[2] Being laid off or fired would generate an effect equivalent to about −2.3 MHI, −2.9 PWB, and +1.7 PSDS units. Thus, we could have observed a difference equal to about one-eighth the effect of being fired or laid-off (see Sec. II).

These comparisons describe the average response across plans. But the average response is composed of many relatively healthy individuals and few sick individuals. Increases in insurance generosity can have little effect on the healthy because they have little need for and make little use of mental health services (Wells et al., 1982; Ware et al., 1984; Keeler et al., 1986). Thus, simple means over all individuals overstates the relative importance of the healthy and understates that of the sick.

Nevertheless, our results do not change when we weight predictions from the least squares model for each individual by the average HIE expenditure for his ninth of the distribution of entry MHI. With this reweighting, an individual in the bottom ninth is 7.7 times as important, in terms of health care costs, as one in the healthiest ninth.

EFFECTS FOR SUBGROUPS

Individuals in different income and mental health status groups at baseline have significantly different responses to insurance plan. The set of two- and three-way interactions (plan × initial mental health × income) are significant for MHI [$F(6, 14863) = 2.31$, $p < 0.05$] and PWB [$F(6, 14863 = 2.34$, $p < 0.05$), but not PSDS [$F(6, 14863) = 1.52$].

Tables 8 and 9 present the standardized plan comparisons for enrollees who were in different mental health status and income subgroups at baseline. Unlike the results at the bottom of Table 7, these results are not corrected for attrition.[3] The top halves of these tables illustrate two-way interactions (plan × mental health status, plan × income). Those who have *poor* initial PWB have more improvement in PWB on the free plan than on the family coinsurance plans ($p < 0.05$). This effect is moderately large: If accumulated over three years (3.6 points) it would exceed our criteria for a clinically meaningful change in PWB (2.85 points, see Sec. II). In contrast, those who have good

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[2] For the attrition-corrected results in Table 7.

[3] Given the small number of dropouts, we did not have the precision to detect higher-order plan/dropout interactions (e.g., plan × dropout x initial health status.

Table 8

DIFFERENCES BETWEEN FAMILY COINSURANCE AND FREE PLANS IN CHANGE IN MENTAL HEALTH STATUS BY INITIAL MENTAL HEALTH STATUS[a] AND INCOME

Baseline[b]		MHI		PSDS		PWB	
Income	Health	Diff.	t	Diff.	t	Diff.	t
Total sample							
All	All	0.14	0.87	–0.18	–1.15	0.13	0.59
Income group							
Poor	All	0.18	0.64	–0.28	–1.11	0.12	0.35
Middle	All	0.13	0.78	–0.15	–0.97	0.12	0.55
Rich	All	0.13	0.62	–0.11	–0.55	0.15	0.51
Mental health group							
All	Sick	–0.25	–1.08	0.15	0.69	–1.20	–1.96[c]
All	Middle	0.21	1.25	–0.17	–1.08	–0.01	–0.04
All	Well	0.46	2.20[c]	–0.53	–2.44[c]	0.56	1.98[a]
Income and mental health groups							
Poor	Sick	–0.23	–0.66	0.13	0.41	–1.42	–1.39
Middle	Sick	–0.26	–1.11	0.16	0.71	–1.04	–1.79
Rich	Sick	–0.25	–0.83	0.16	0.56	–0.97	–1.28
Poor	Middle	0.28	1.04	–0.28	–1.14	–0.03	–0.09
Middle	Middle	0.20	1.19	–0.15	–0.98	–0.01	–0.03
Rich	Middle	0.16	0.74	–0.09	–0.43	0.01	0.04
Poor	Well	0.55	1.59	–0.80	–2.12[c]	0.70	1.52
Middle	Well	0.44	2.12[c]	–0.47	–2.21[c]	0.53	1.88
Rich	Well	0.39	1.48	–0.36	–1.30	0.47	1.30

NOTE: A positive difference for MHI or PWB indicates that the free plan is worse and a negative difference for PSDS indicates that the free plan is worse.

[a] The initial measure for that particular outcome (MHI, PSDS, or PWB).

[b] Defined by tertiles of income (poor, middle, rich) and mental health status (sick, middle, well).

[c] Significant at $p < 0.05$, two-tailed.

Table 9

DIFFERENCES BETWEEN INDIVIDUAL DEDUCTIBLE AND FREE PLANS IN CHANGE IN MENTAL HEALTH STATUS BY INITIAL MENTAL HEALTH STATUS[a] AND INCOME

Baseline[b]		MHI		PSDS		PWB	
Income	Health	Diff.	t	Diff.	t	Diff.	t
Total sample							
All	All	0.23	1.17	−0.26	−1.39	0.03	0.09
Income group							
Poor	All	0.48	1.53	−0.47	−1.54	0.27	0.62
Middle	All	0.20	1.02	−0.22	−1.18	0.02	0.06
Rich	All	0.01	0.05	−0.10	−0.42	−0.20	−0.57
Mental health group							
All	Sick	−0.14	−0.50	0.04	0.14	−1.16	−1.57
All	Middle	0.30	1.46	−0.25	−1.31	−0.02	−0.07
All	Well	0.53	2.05[c]	−0.59	−2.12[c]	0.27	0.77
Income and mental health groups							
Poor	Sick	−0.35	−0.80	0.14	0.34	−2.70	−2.13[c]
Middle	Sick	−0.06	−0.22	0.00	0.01	−0.18	−0.26
Rich	Sick	0.05	0.13	−0.06	−0.16	0.60	0.65
Poor	Middle	0.71	2.19[c]	−0.45	−1.54	0.06	0.14
Middle	Middle	0.25	1.22	−0.22	−1.18	−0.01	−0.03
Rich	Middle	0.00	0.01	−0.10	−0.40	−0.10	−0.29
Poor	Well	1.28	3.01[c]	−1.23	−2.65[c]	1.21	2.14[c]
Middle	Well	0.42	1.63	−0.46	−1.70	0.09	0.26
Rich	Well	−0.00	−0.00	−0.15	−0.44	−0.43	−0.95

NOTE: A positive value indicates that the free plan is worse for MHI and PWB, and a negative value indicates that the free plan is worse for PSDS.

[a] The initial measure for that particular outcome (MHI, PSDS, or PWB).

[b] Defined by tertiles of income (poor, middle, rich) (sick, middle, well).

[c] Significant at $p < 0.05$, two-tailed.

initial mental health status by each of the three scales are significantly better off on the family coinsurance and on the individual deductible plans than on the free plan (each $p < 0.05$). These effects are small to moderate; if accumulated over five years, the changes in each mental health indicator would exceed our criteria for a clinically meaningful effect.

As Tables 8 and 9 show, for any particular income subgroup, the effects of insurance plan are not significantly different from zero. The bottom halves of Tables 8 and 9 demonstrate the three-way interactions between insurance plan, initial mental health status, and income. Several of the subgroups with initially good mental health status but low- or middle-level income have significantly better mental health outcomes on the family coinsurance and individual deductible plans than on the free plan. The effect sizes are small to moderate. For example, for the poor well, psychological distress is reduced more on the individual deductible plan than on the free plan. The difference accumulated over two years (2.46 PSDS scale points) is greater than our criterion for a clinically meaningful difference in PSDS (1.66 points, see Sec. II). By contrast, those with initially low PWB and who are poor have significantly *better* mental health outcomes under the free plan than under the individual deductible plan (Table 9). The effect is large: The change in one year (2.7 scale points) is similar to our criterion for a clinically meaningful difference in PWB (2.85 points).

Although plan comparisons are not significantly different from zero for many subgroups, the subgroups are significantly different from each other, especially the sick poor and the well poor, who have opposite responses to insurance coverage. Two results that are of opposite sign and individually not significantly different from zero can be significantly different from each other. In this case, the pattern of different responses by subgroup can be seen in the three-way interaction of plan, initial mental health status, and family income adjusted for family size.

Figure 1 presents a hypothetical example of such an interaction. On the vertical axis, we plot differences in mental health status over time. On the horizontal axis, we plot enrollment mental health status. The solid and dotted lines are the response of hypothetical plans A and B. As Fig. 1 shows, there is a marked difference in response to the plans for the initially ill but not for the initially well. As Fig. 2 shows, it is also possible for the responses to plans A and B for the initially sick to be significantly different from each other but for neither response to be significantly different from zero.

As Fig. 2 further illustrates, there could also be no dominant plan for the whole population but significant differences for subsets. In this

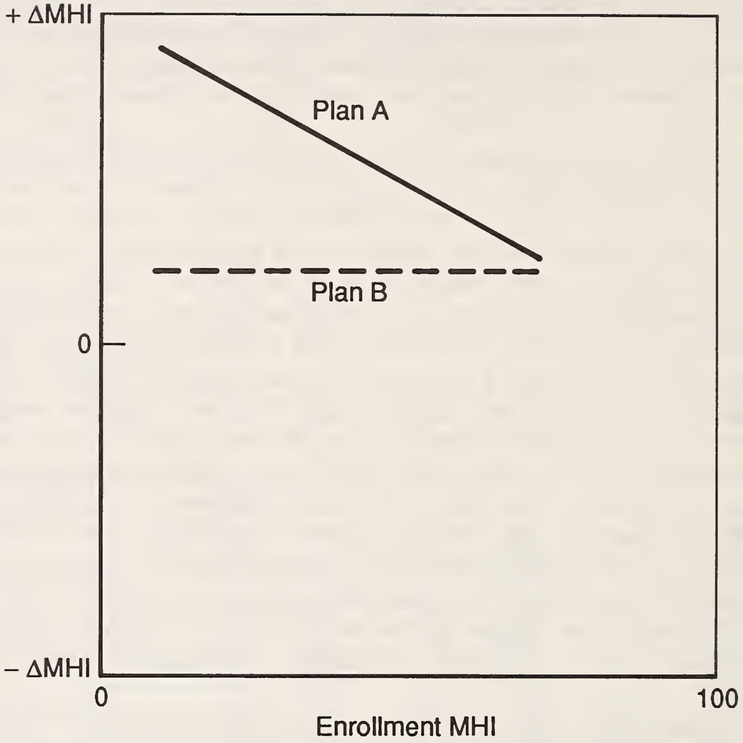

Fig. 1—Hypothetical response to insurance coverage

case, the insignificant effect for the initially well dilutes the significant effect for the initially sick. For this case, there is a significant effect of plan which shows up in the interaction term, but not the main effect.

Because of limited precision, we cannot choose among these competing explanations for the significant interaction effects we observe.

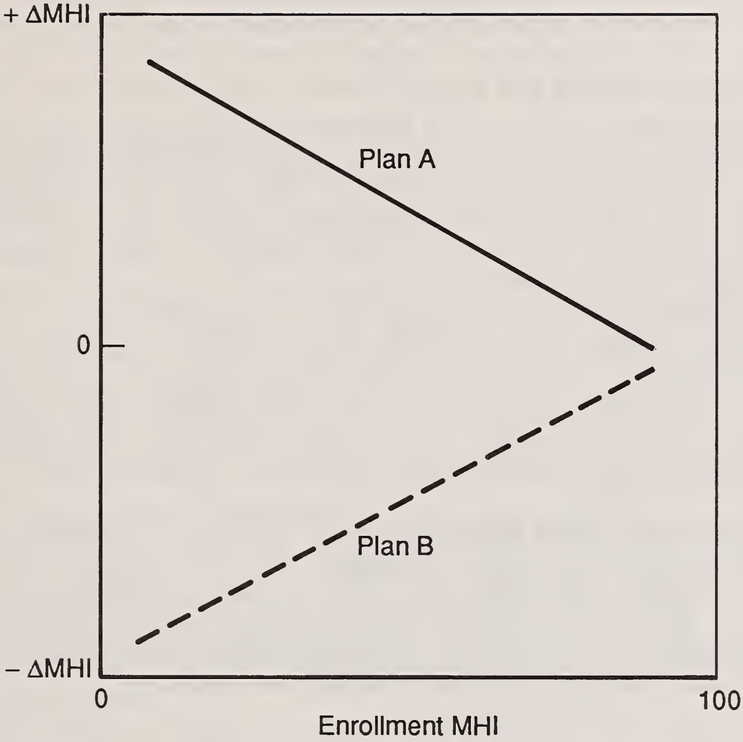

Fig. 2—Hypothetical response to insurance coverage

SENSITIVITY ANALYSES

The preceding comparisons of the free and family coinsurance plans lump the 25, 50, and 95 percent plans together. Given the differences in use of outpatient mental health care among these plans (Manning et al., 1986), we might expect differences by coinsurance level in change in mental health status. To see if this was the case, we replaced the plan indicators with two alternative specifications:

1. A function of the coinsurance rate without correction for exceeding the MDE.
2. A function of the expected coinsurance rate (Ellis's (1986) correction for MDE effects).

The former gives a biased estimate of the effect of pure price (i.e., in the absence of an upper limit on out-of-pocket expenditures) because it ignores the fact that those on higher coinsurance rates were more likely to exceed the MDE and receive free care for part of the year. That is, the response to the 95 percent plan is a mix of responses to 95 percent coinsurance rate for those who do not exceed the MDE and a response to free care for those who go over the MDE. To correct for the MDE effect, we multiply the coinsurance rate by one minus the predicted probability that a family will exceed the MDE in that year; see Ellis (1986) for further details.

Replacing the indicator for the family coinsurance plans by a coinsurance function did not alter the qualitative conclusions. The predicted mean response for a hypothetical plan with a 100 percent coinsurance rate (and implicitly the average MDE) was an insignificantly 0.10 to 0.16 units of MHI better than on the free plan ($t < 0.83$), depending on the specification of the coinsurance function as linear or quadratic.

Using an expected price approach (Ellis, 1986) we obtained a larger estimate of the response to insurance. That is, the estimated pure price response was larger than the response to aggregated specific plans. Nevertheless, the main effect of pure price was not statistically significant ($|t| < 1.28$). The qualitative pattern of other plan results remained unchanged using the expected price approach.

IV. DISCUSSION

The purposes of our analyses were to: (1) use more precise methods to reexamine the conclusion of Brook et al. (1983, 1984), Valdez et al. (1985), and Valdez (1986) that there is no significant difference, on average, between the mental health outcomes achieved on free care and cost sharing plans; (2) examine the response of the sick poor to insurance in detail; and (3) determine the comparability of conclusions about the effects of variation in cost sharing on changes in psychological well-being and the more clinically relevant psychological distress.

Like the earlier HIE results, we found no adverse effect, averaged over the covered population, of cost sharing plans, relative to a free care plan, on mental health outcomes (i.e., change in mental health status). We reached this conclusion using more data and a variety of more efficient statistical approaches than previous studies.

Nevertheless we found that different subgroups had better outcomes on different plans. Those who initially had good mental health status had significantly more improvement in mental health status on both family coinsurance and individual deductible plans than on the free plan. This result was particularly strong for those who were both initially well and poor.

For some plan comparisons, those with initially low psychological well-being, especially those who were also poor, had significantly greater improvement under free care than under either type of cost sharing plan. These effects were large in magnitude. But because we did not observe a similar result for psychological distress, which we think is more clinically meaningful, we cannot confidently conclude that the sick poor have better mental health status under free care than under cost sharing. We caution against generalizing our main result of no adverse effect of cost sharing plans on mental health status to this very policy-relevant subgroup (e.g., those in Medicaid).

Why did increased cost sharing have few adverse effects, on average, on mental health? One explanation is that several features of the HIE design protected families from either adverse financial consequences of major illnesses or from other factors that are commonly associated (in prevailing insurance plans) with reduced generosity of insurance. First, all the HIE cost sharing plans included an upper limit on the family's out-of-pocket expenditures, beyond which care was free for the rest of the year (with the exception of a few excluded services). Even the poorest families could afford private hospitalization once the income-related limit on expenditures was exceeded. Second, all the HIE plan benefits included outpatient psychotherapy (up to 52 visits per person per year) and inpatient psychiatric care was covered on a parity with inpatient medical care. Thus, greater cost sharing was not associated, as is the case with many current plans, with less comprehensive mental health benefits. Third, all families participating in the HIE had some insurance coverage. Thus, the lack of adverse effects of cost sharing occurred in the context of mandated mental (and general) health insurance with full catastrophic coverage. Cost sharing could have more adverse effects in the absence these features. For example, in the absence of a cap on out-of-pocket expenditures, lower-income groups might receive less health care during the year or receive lower quality care.

Another explanation for our main conclusion is that a low proportion of HIE participants in any plan received services specifically designed to improve their mental health. Even in the free plan, for example, only 4.3 percent of the HIE participants received any outpatient psychotherapy (Manning et al., 1986). Over the course of five years, about 13 percent of participants ever used these services on the free plan (Keeler et al., 1986). Thus, it is not surprising to find few effects of variation in cost sharing averaged over the covered population (of users and nonusers).

As a result, we think that effects of increased insurance generosity on mental health status might largely reflect the consequences of greater use of general *medical* services, which a majority of participants received. More general medical care could improve mental health outcomes directly through increased detection and treatment of psychiatric disorders by general medical providers or indirectly through improvement in physical disorders and relief of secondary mental disorders. Alternatively, more general medical care could lead to worse mental health outcomes through adverse side effects of medical treatments or inappropriate interpersonal care.

Adverse effects of medical treatments are one possible explanation for our finding of more adverse mental health outcomes for some subgroups under free care than under cost sharing plans. Such adverse effects were largely limited to those who initially had good mental health status and who were poor. One possible reason for this pattern of results is that there might be relatively fewer benefits of care (e.g., relief of psychological distress) to offset any negative effects of care for those with initially better mental health status. Alternatively, providers may tend to deliver treatments, such as psychotropic medications, even to patients who may be well. Further, the initially well who are *poor* may have relatively fewer resources, such as knowledge of the health care system or financial resources, to buffer any adverse consequences of medical care.

LIMITATIONS

Our results do not address the effects of increased cost sharing in the absence of full catastrophic coverage. Because we did not observe a completely uninsured group, we also cannot comment on the effects of having no insurance. Lurie et al. (1984, 1986) demonstrated that loss of insurance coverage can have significant adverse physiological consequences for the sick who are near poor.

Any single insurer that altered the level of cost sharing could observe a seemingly different effect of that change on mental health outcomes than reported here. Individuals who were sicker or had a greater propensity to use could select more generous plans, making outcomes on these plans appear relatively worse *if unadjusted for initial case mix.*

The experiment excluded the military and their dependents, the Medicare disabled, the elderly, and those not residing in households (e.g., the homeless and those institutionalized in long-term hospitals and jails). Thus, the results described here do not necessarily apply to several groups of persons with psychiatric disorders of considerable policy interest.

The HIE did not include measures of specific psychiatric disorders, such as the currently available Schedule for Affective Disorders and Schizophrenia (SADS) or Diagnostic Interview Schedule of NIMH (Endicott and Spitzer, 1978; Robins et al., 1981). Thus, we cannot comment on the effects of insurance coverage on either course of psychiatric disorders or on the general mental health status of those with specific psychiatric disorders. Other investigators are currently conducting studies of the specific effects of alternative payment mechanisms, especially capitation, on the seriously mentally ill (Lehman, 1987).

The analyses presented here do not address the question of efficacy of care. We estimated changes in mental health status for all persons covered by insurance plans, whether or not they received any general or mental health care.

SUMMARY

We found no large differences, averaged over the entire covered population, in the degree of change over time in mental health status when persons were covered by insurance plans that differed enough in generosity to cause large differences in utilization. We cannot definitively comment on the effects of generosity of coverage on the mental health status of the sick poor, especially the seriously mentally ill who do not reside in households. However, for some subgroups, especially the poor with initially good mental health status, mental health outcomes were more favorable under some degree of cost sharing than under free care. Given the low level of use of mental health services, this effect might be due to curtailment of inappropriate use of medical services for physical health problems. Finally, the effects of cost sharing on mental health status reported here occurred in the context of mandated comprehensive general and mental health benefits with catastrophic coverage.

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